not a thermometer with me). It was a warm summer's day—July 23. The ice exhibited the usual prismatic structure, but the prisms seldom exceeded a third of an inch in diameter. I was informed that in winter it was choked up with snow. The other fissure also contained ice, but as it was less accessible, and seemed in no way different from the former, I did not enter it. The especial interest of this case is that it affords what I might call the most rudimentary type of a *glacière;* a natural ice-house, replenished every winter, and perhaps sometimes entirely cleared out during an unusually hot summer. The "Grotto" on Monte Tofana, near the Ampezzo Pass (which I have not been able to visit), is, I expect, another of this kind.

St. John's College, Cambridge T. G. BONNEY

[By a misprint "glacier" was put for *glacière* in the last paragraph of Mr. Ward's paper.—ED.]

The Morse Code

THE following mnemonical device may be of some use to young telegraph students, and others, who wish to commit the Morse alphabet to memory. There is, I believe, a device employed in the Government schools, but it gives one so little help that I lately jotted down the subjoined scheme for my own instruction.

Let the vowels *a e i o u* and also *s h* represent the dots, and the remaining letters of the alphabet the dashes in the Morse code: the word attached to each letter will then express the signal for that letter. These words must be learnt; a task rendered easy by their commencing with or containing the letter they signify.

A	· —	at	N	— ·	no
B	— · · ·	base	O	— — —	P.Q.R
C	— · — ·	cave	P	· — — ·	Apps
D	— · ·	die	Q	— — · —	Q.Q.E.D
E	·	E	R	· — ·	are
F	· · — ·	safe	S	· · ·	ass
G	— — ·	Gnu	T	—	T
H	· · · ·	hush	U	· · —	Usk
I	· ·	is	V	· · · —	Asov
J	— — — —	Ujgj	W	· — —	awl
K	— · —	kit	X	— · · —	Faux
L	· — · ·	aloe	Y	— · — —	yawl
M	— —	my	Z	— — · ·	zwei

A few of the letters, *e.g.* J (the word for which might be regarded as a new way of spelling Ujiji), O, and Q, present a little difficulty, which some of your readers may lessen. As it is, these exceptional cases are so quickly impressed on the memory that the code thus learnt can be written in a surprisingly short time, and read soon afterwards. It is hardly possible the plan here suggested can be new, yet, as I have not met with anything similar, I venture to send it to you for publication.

W. F. BARRÉTT

The Micrographic Dictionary—Pollen Grains

AT present I have to do with the "Micrographic Dictionary" and the two other works mentioned in my letter printed in NATURE, vol. xi., p. 286. If the pollen grains of *Mimulus moschatus* are variable (as now stated by Mr. Cooke on the authority of Dr. Mohl), how is it that the figures and descriptions in the books mentioned are all alike? There is no variability here, but wonderful sameness both in illustrations and letter-press.

As the accuracy of my first simple observation has been called in question, I will add another. In the "Micrographic Dictionary," Pl. 32, Fig. 28, is given the pollen of *Sonchus palustris*. This, like that of the Mimulus, is totally wrong, the reticulation is by no means correct, and the abundant spines with which this pollen grain is clad (so common in the Compositæ) are totally omitted. Now, on turning to the Rev. J. G. Wood's book, Pl. 3, Fig. 24, this erroneous figure is reproduced with incorrect reticulation and no spines, and on referring to Mr. Cooke's work, Pl. 2, Fig. 6, the same errors are again perpetrated.

W. G. SMITH

OUR ASTRONOMICAL COLUMN

ζ^1 AND ζ^2 RETICULI.—These stars of about the sixth magnitude appear to offer a similar instance of large and nearly equable proper motion to the well-known one afforded by 36 Ophiuchi and 30 Scorpii, which was first pointed out by Bessel in the "Fundamenta Astronomiæ." If we compare Lacaille's positions (taking them from the reduced catalogue published by the British Association) with those given by the late Capt. Jacob from the Madras observations 1853-57, we find with the Pulkova precessions—

	R.A.	Secular Proper Motion. N.P.D.	Arc of great circle.	Direction of motion.
ζ^1 ...	$+237''.5$	$-74''.9$	$130''.3$	$54°.9$
ζ^2 ...	$+238''.7$	$-79''.6$	$133''.8$	$53°.4$

The introduction of Brisbane's places would only modify the above figures in a trifling degree.

When competent observers in the southern hemisphere are provided with heliometers for research on stellar aarallax, there will be no lack of objects to occupy their pttention, and we may expect most important results from such investigations.

THE BINARY STAR η CASSIOPEÆ.—We may very soon be able to make a fair approximation to the orbit of this double star, and so, with Mr. Otto Struve's value for the annual parallax, form some idea of the real dimensions and mass of the system, as is already the case with *a* Centauri and 70 Ophiuchi. An orbit given by Mr. Powell, of Madras, in vol. xxi. of *Monthly Notices*, R. A. S., is probably vitiated by typographical error or errors. Struve's parallax is $0''.154 \pm 0''.045$.

THE BINARY STAR *a* CENTAURI.—According to Mr. Powell's last elements, which are founded on measures up to 1870 inclusive, the components, at the present time, are nearly at their minimum apparent distance ($1''.2$), and the angle of position is advancing at the rate of 10° monthly. It may be hoped this fine object is receiving due attention from astronomers in the southern hemisphere at this critical period of the revolution. There would appear to be no probability of such difficulties attending observations at the passage of the peri-astron as those presented by γ Virginis in 1836, so far at least as can be judged from the measures to 1870.

RED STARS.—Amongst the red stars notified by the late M. Chacornac, is one which he estimated between the seventh and eighth magnitude, and of which he says, "éclat terne et nebuleuse." The position assigned identifies the star with No. 1172 of Rümker's Catalogue, whence for the commencement of the present year its right ascension is 4h. 16m. 16s., and polar distance 67° 19′.7. Rümker calls it a sixth magnitude, and Argelander (Durchmusterung) an eighth. Although different eyes will not always agree in estimations of brightness of the ruddy stars, there appears here to be a suspicion of variable light. Another of Chacornac's isolated red stars he himself indicates as variable. It is Oeltzen 21356, called 6 mag. by Lalande (No. 41453), 5·6 by Argelander, 5 in the Washington Zone, 1848, July 24; while Chacornac remarks, "sometimes brighter and sometimes fainter than a star of the seventh magnitude near it," which is probably Oeltzen 21386. Position for 1875, R.A. 21h. 17m. 5s.; P.D., 111° 22′.7. Neither of these stars is in Schjellerup's Catalogue, but that list is very far from being a complete one.

ENCKE'S COMET.—The extreme faintness of this comet at the present appearance is attracting the attention of astronomers who have had most experience of the circumstances of previous returns. Last week we quoted the remark of M. Stéphan on this subject, and we learn from him that he was using a newly polished mirror in the great Foucault telescope of the Observatory of Marseilles. In 1868 and 1871 the comet's appearance was very similar to what it had been in previous years under analogous conditions. In discussing the probability of any real change in the comet's constitution, it may, however, be well to bear in mind that in the year 1842, when the peri-

helion passage occurred on the same day of April, Encke was very doubtful of the comet being visible at all in this hemisphere, and had contented himself with transmitting an ephemeris to Greenwich, to be passed on to the Cape of Good Hope. It was only after Dr. Galle had detected with the Berlin refractor, on the evening of February 8, a very faint nebulosity within 2′ of the predicted position of the comet, that Encke communicated the ephemeris to the *Astronomische Nachrichten* (see No. 443). In 1842, on March 23, the comet was seen "distinctly in the twilight, with the moon shining brightly." At the beginning of the second week in April the condensation of light was very great, and a fine bright point was remarked: it was not seen in Europe after the 9th of this month.

BEARING OF METEOROLOGICAL RECORDS ON A SUPPOSED CHANGE OF CLIMATE IN SCOTLAND *

IT is a belief very generally entertained that the climate of Scotland has undergone considerable change in recent years, the summers being less hot and the winters less severe than they used to be. This idea was advocated by Mr. M'Nab in his presidential address to the Edinburgh Botanical Society in November 1873, the facts adduced in support of it referring solely to vegetation. In this paper the question is examined exclusively from a meteorological point of view, and the examination is confined to monthly mean temperatures.

The following are the records which have been made use of:—1. Monthly mean temperatures from observations made at Gordon Castle, Banffshire, from July 1781 to November 1827; 2. The monthly temperatures given in Forbes' climate of Edinburgh (Trans. Roy. Soc. Edin., vol. xxii. p. 335); 3. Observations made at Dollar from 1836 to 1856, and from 1861 to 1874; and 4. Observations made at Elgin from 1855 to 1874. The mean temperatures of the months and the year were calculated for each of these four series of observations for the interval embraced by each, and then the differences of each month's mean temperature from the general mean for that month and station were set down in a table. Since the time over which each of these series of observations extended was sufficiently long to give a very close approximation to the true mean for the hour of observation and exposure of the thermometers, and since the separate months were only compared with the means for that place, the table may be regarded as representing very closely the *monthly variations* which have occurred in the temperature of Scotland during the past ninety-four years. It may be noted that the observations were made in two districts, viz., Gordon Castle and Elgin in the north, and Edinburgh, Dunfermline, and Dollar in the south.

The variations of each year, and of each month of each year, were then projected in curves, showing graphically the fluctuations which have occurred during this long period. The coldest year was 1782, being 3°·3 under the average, the deficiency of May of that year being 6°·7, and August 5°·9; then follow 1799 and 1816, being 2°·3; 1838, being 2°·0; and 1860, being 2°·4 under the average. The two warmest years were 1794 and 1846, the excess being respectively 2°·7 and 2°·9. During the nine years from 1787 to 1795, the temperature was generally above the average; the mean annual excess of the nine years being 1°·5. For the next quarter of a century temperatures were generally under the average. From this period to the present time there have occurred five fluctuations in the annual temperature above and below the average, differing in amplitude and duration, but giving no indication of a steady permanent change either way. Exceptionally warm and exceptionally cold months are distributed over the period in such a manner as to show that substantially no permanent change has taken place in the temperature of any of the months.

Since, however, the eye may not be able easily to detect any steady rise or fall that may be going on owing to the sharply serrated character of the curves, other averages were calculated on the method of taking as the average of, say, January 1784, not the average of that year, but the average of the five years 1782, 1783, 1784, 1785, and 1786. All the averages were dealt with in this way, and the results projected in a set of thirteen new curves. From these consecutive five years' averages, it is seen that mild Decembers prevailed from 1787 to 1797, from 1822 to 1845, and from 1862 to 1867; and cold Decembers from 1798 to 1821, from 1846 to 1861, and from 1868 to the present time. It may be noted that in 1821 the remark might have been made from the previous forty years' observations, that the character of Christmas weather had undergone a great change, the Christmases of the latter part of the period being generally much more severe; and again, in 1843, looking at the long period of forty-seven years, beginning with 1796, it might have been said that the old-fashioned Christmas weather had almost ceased to occur in the latter half of this long period, and that the climate had undergone some great permanent change. Now, while both would have been right as to the facts (whether these facts were based on numerical data or on recollections), both would have been wrong in inferring a permanent change, even though the inference was based on the observations of half a century. Looking, however, at the ninety-four-years' period, we can only conclude that the weather of December, as regards temperature, is subject to large fluctuations, which differ both in intensity and duration, and that there is no tendency to a permanent increase or decrease.

One of the most interesting features of the curves is the similarity existing among them *inter se*. The curves for August and September closely resemble each other, as also do those for November and December, while that for October combines the main features of the two sets. The curve for January combines the main features of the curves for November and December on the one hand and February and March on the other, and so on with the other months.

The general result of the inquiry then is, that though large annual fluctuations of temperature have occurred, yet the warm and the cold cycles, extending over longer or shorter periods, are so distributed over these long intervals as to give no indication that there has been any tendency towards a steady increase or decrease in the temperature, or that any permanent change has taken place in the climate of Scotland. And since the same remark applies with equal force to the observations of the separate months, it follows that meteorological records give no countenance to the idea of a permanent change having occurred in the climate of Scotland either as regards summer heat or winter cold. It may be added that during the past seven years the temperature of July has been above its average respectively 2°·8, 1°·7, 2°·0, 0°·2, 1°·7, 1°·0, and 1°·8, and that of December, as compared with its average + 1°·5, − 4°·2, − 5°·6, − 1°·1, − 0°·8, + 3°·4, and − 7°·4; results quite in the opposite direction of the popularly entertained belief that the summers are colder and the winters milder than formerly.

ALEXANDER BUCHAN

* Abstract of a paper read at the General Meeting of the Scottish Meteorological Society, held on 10th Feb.

NATURAL PHENOMENA IN SOUTH AMERICA *

THE following notes may, I hope, possess some interest for the readers of NATURE. They were made during an expedition which took place last

* Notes of some observations made by a telegraphist during a cable-laying expedition from Pará to Cayenne.